

## IN THE CLAIMS

An entire listing of the currently pending claims is provided.

1. (currently amended) A laser system, comprising:
  - a laser capable of producing a beam of output light;
  - a detector unit;
  - a fringe-producing optical element disposed in the beam of output light to direct a first portion of the beam of output light to the detector unit as a second light beam, the fringe-producing optical element comprising one of a diffractive etalon and a non-parallel etalon, the non-parallel etalon comprising one of a non-planar etalon, a Fresnel etalon, and a binary etalon, an interference fringe pattern being produced in the second light beam by the fringe-producing optical element, a second portion of the output light beam, different from the first portion, propagating from the fringe-producing optical element; and
  - a control unit coupled to receive detector information from the detector unit and coupled to the laser to control the wavelength of the beam of output light in response to the information received from the detector unit.
2. (Original) A system as recited in claim 1, wherein the laser is a semiconductor laser.
3. (Original) A system as recited in claim 1, further comprising a light beam collimator disposed on the beam of output light between the laser and the fringe producing element so that the output light beam at the fringe-producing element is substantially collimated.
4. (Previously Presented) A system as recited in claim 1, wherein the second light beam includes a first component from a first side of the fringe-producing optical element and a second component from a second side of the fringe-producing optical element, the interference fringe pattern being produced by interference between the first and second components.

5. (Previously Presented) A system as recited in claim 1, wherein the detector unit has at least three detector elements illuminated by respective portions of the interference fringe pattern.

6. (Previously Presented) A system as recited in claim 5, wherein the respective portions of the interference pattern correspond to regions of different phase of the interference fringe pattern.

7. (Previously Presented) A system as recited in claim 6, wherein there are  $n$  detector elements,  $n$  being greater than two, and the regions of different phase of the interference fringe pattern are spaced apart by approximately  $2\pi/n$ .

8. (Previously Presented) A system as recited in claim 1, further comprising a reflector disposed between the fringe-producing element and the detector unit to reflect the second light beam from the fringe-producing element to the detector unit.

9. (Original) A system as recited in claim 1, wherein the fringe-producing optical element reflects the second light beam to the detector unit.

10-15 (canceled)

16. (Original) A system as recited in claim 1, wherein the fringe-producing optical element transmits the second light beam to the detector unit.

17. (canceled)

18. (Previously Presented) A system as recited in claim 1, further comprising an output optical fiber and a focusing unit disposed to focus the second portion of the output light beam into the optical fiber.

19. (Original) A system as recited in claim 1, further comprising a control unit coupled to receive light detection information from the detector unit and to determine an output

power of the laser, the control unit further being coupled to the laser to stabilize the output power of the laser to a desired power level.

20. (Previously Presented) A system as recited in claim 1, wherein the control unit determines a shift of an operating wavelength of the laser from a desired wavelength, the control unit being coupled to the laser to tune the operating wavelength of the laser to the desired wavelength.

21. (Original) A system as recited in claim 1, wherein the second light beam has a power level of no more than about 10% of a power level of the output light beam incident on the fringe-producing element.

22. (currently amended) An optical communications system, comprising:  
an optical communications transmitter unit having one or more laser units, at least one of the one or more laser units producing a laser output beam and having a wavelength stabilizing unit, the wavelength stabilizing unit including  
a detector unit,  
a fringe-producing optical element disposed in the laser output beam to direct a first portion of the laser output beam to the detector unit as a second light beam, the fringe-producing optical element comprising one of a diffractive etalon and a non-parallel etalon, the non-parallel etalon comprising one of a non-planar etalon, a Fresnel etalon, and a binary etalon, the fringe-producing optical element causing an interference fringe pattern in the second light beam, a second portion of the output light beam propagating from the fringe-producing optical element, and  
a control unit coupled to receive detection signals from the detector unit and adapted to generate a laser frequency control signal for controlling wavelength of the at least one of the one or more laser units,  
an optical communications receiver unit; and  
an optical fiber communications link coupled to transfer light from the second portion of the output light beam from the optical communications transmitter unit to the optical communications receiver unit.

23. (Original) A system as recited in claim 22, further comprising a series of fiber amplifiers disposed on the optical fiber communications link, the series of fiber amplifiers including at least one fiber amplifier unit.

24. (Original) A system as recited in claim 22, wherein the optical communications transmission unit includes at least two laser units operating at different wavelengths and further comprising wavelength division multiplexing elements to combine light output from the at least two laser units to produce a multiple channel optical communications signal coupled to the optical fiber communications link.

25. (Original) A system as recited in claim 24, wherein the optical communications receiver unit includes wavelength division demultiplexing elements to separate the multiple channel optical communications signal into signal components of different wavelengths and further includes channel detectors to detect respective signal components.

26. (Currently amended) A method of stabilizing an operating frequency of an output light beam produced by a laser, the method comprising:

splitting a first portion from the output light beam as a second light beam using a fringe-producing optical element, the fringe-producing optical element causing an interference fringe pattern in the second light beam, the fringe-producing optical element comprising one of a diffractive etalon and a non-parallel etalon, the non-parallel etalon comprising one of a non-planar etalon, a Fresnel etalon, and a binary etalon;

detecting portions of the interference fringe pattern using a detector unit;

producing detector signals in response to the detected portions of the interference fringe pattern;

generating a frequency control signal in response to the detector signals;

tuning the laser in response to the frequency control signal so that the operating frequency of the output light beam is substantially at a desired value; and

propagating a second portion of the output light beam, different from the first portion, from the fringe-producing optical element.

27. (Original) A method as recited in claim 26, wherein deflecting the portion of the output light beam includes reflecting the portion of the output light beam using the fringe-producing optical element.

28-33 (canceled)

34. (Original) A method as recited in claim 26, wherein deflecting the portion of the output light beam includes transmitting the portion of the output light beam through the fringe-producing optical element.

35. (Original) A method as recited in claim 34, wherein the fringe-producing optical element is a diffractive etalon.

36. (Original) A method as recited in claim 26, wherein deflecting the portion of the output light beam includes deflecting no more than about 10% of the output light beam.

37. (Original) A method as recited in claim 26, wherein deflecting the portion of the output light beam includes deflecting a first component from a first side of the fringe-producing optical element and deflecting a second component from a second side of the fringe-producing optical element, the second beam including the first and second components.

38. (Original) A method as recited in claim 26, wherein detecting the portions of the interference fringe pattern include detecting at least three different portions of the interference fringe pattern.

39. (Original) A method as recited in claim 38, wherein the at least three different portions of the interference fringe pattern correspond to regions of different phase of the interference pattern.

40. (Original) A method as recited in claim 39, wherein the regions of different phase of the interference fringe pattern are selected from more than one period of the interference fringe pattern.

41. (Original) A method as recited in claim 38, wherein the detector unit has  $n$  detector elements that detect respective portions of the interference pattern spaced apart by approximately  $2\pi/n$ .

42. (Original) A method as recited in claim 26, wherein generating the frequency control signal includes generating phase signals from the detector signals, and generating transformed phase signals using the phase signals and reference phase signals.

43. (currently amended) A method of stabilizing an operating frequency of an output light beam produced by a laser, the method comprising:

splitting a first portion from the output light beam as a second light beam using a fringe-producing optical element, the fringe-producing optical element comprising one of a diffractive etalon and a non-parallel etalon, the non-parallel etalon comprising one of a non-planar etalon, a Fresnel etalon, and a binary etalon, the fringe-producing optical element causing an interference fringe pattern in the second light beam, a remainder of the output light beam after splitting the first portion being a second portion of the output light beam; and

stabilizing the operating frequency of the output light beam using the interference fringe pattern.

44. (Original) A method as recited in claim 43, wherein deflecting the portion of the output light beam includes reflecting the portion of the output light beam using the fringe-producing optical element.

45-46 (canceled)

47. (Original) A method as recited in claim 43, wherein deflecting the portion of the output light beam includes transmitting the portion of the output light beam through the fringe-producing optical element.

48. (Original) A method as recited in claim 47, wherein the fringe-producing etalon is a diffractive etalon.

49. (Original) A method as recited in claim 43, wherein deflecting the portion of the output light beam includes deflecting no more than about 10% of the output light beam.

50. (Currently amended) A system for stabilizing an operating frequency of an output light beam produced by a laser, the system comprising:

a laser capable of producing an output light beam;

fringe-producing means for splitting the output light beam into a second light beam and a third light beam and for forming an interference fringe pattern in the second light beam, the third light beam propagating from the fringe-forming means, the fringe-producing means having at least one optical surface that is not flat; and

means for stabilizing the operating frequency of the output light beam using the interference fringe pattern.

51. (previously presented) A laser system as recited in claim 26, further comprising directing the second portion of the output light beam into an output optical fiber.

52. (previously presented) A laser system as recited in claim 43, further comprising directing the second portion of the output light beam into an output optical fiber.

53. (new) A laser system, comprising:

a laser capable of producing output light in a first light beam, the first light beam propagating towards an output port;

a detector unit;

a fringe-producing optical element disposed in the first light beam, the fringe-producing element having an input surface and an output surface, the first light beam entering the fringe-producing optical element through the input surface, exiting the fringe-producing optical element through the output surface and passing from the output surface to the output port, the fringe-producing element directing a portion of the first light beam as a second light beam through the output surface to the detector unit, an interference fringe pattern being produced in the second light beam by the fringe-producing optical element; and

a control unit coupled to receive detector information from the detector unit and coupled to the laser to control the wavelength of the beam of output light in response to the information received from the detector unit.

54. (new) A system as recited in claim 53, further comprising an output optical fiber having a fiber end, the output port comprising the fiber end, and a focusing unit disposed in the first light beam to focus light in the first light beam, propagating from the fringe-producing element, to the output optical fiber.

55. (new) A system as recited in claim 53, wherein the fringe-producing optical element comprises a diffractive etalon.

56. (new) A system as recited in claim 53, further comprising a light beam collimator disposed on the first light beam between the laser and the fringe producing element so that the first light beam is substantially collimated at the fringe-producing element.

57. (new) A system as recited in claim 53, wherein the second light beam includes a first component from the input surface and a second component from the output surface, the interference fringe pattern being produced by interference between the first and second components.

58. (new) A system as recited in claim 53, wherein the detector unit has at least three detector elements illuminated by respective portions of the interference fringe pattern.

59. (new) A system as recited in claim 58, wherein there are  $n$  detector elements,  $n$  being greater than two, and the regions of different phase of the interference fringe pattern are spaced apart by approximately  $2\pi/n$ .

60. (new) A system as recited in claim 53, wherein the second light beam has a power level of no more than about 10% of a power level of the output light beam incident on the fringe-producing element.



61. (new) A method of stabilizing an operating frequency of an output light beam produced by a laser, the method comprising:

- transmitting the output light beam into a fringe-producing optical element through an input surface;
- propagating the output light beam out of the fringe-producing optical element through an output surface to an output port;
- producing a second light beam using the fringe-producing optical element, an interference fringe pattern being introduced to the second light beam by the fringe-producing optical element;
- propagating the second light beam out of the fringe-producing optical element through the output surface to a detector unit;
- detecting at least a portion of the interference fringe pattern in the second light beam;
- and controlling the frequency of the output light beam in response to the detected portion of the interference fringe pattern.

62. (new) A method as recited in claim 61, wherein controlling the frequency of the output light beam comprises producing detector signals in response to the detected portions of the interference fringe pattern, generating a frequency control signal in response to the detector signals and tuning the laser in response to the frequency control signal.

63. (new) A method as recited in claim 61, wherein the fringe-producing optical element is a diffractive etalon.

64. (new) A method as recited in claim 61, wherein the second light beam has a power of no more than about 10% of the power of the output light beam produced by the laser.

65. (new) A method as recited in claim 61, wherein detecting at least a portion of the interference fringe pattern includes detecting at least three different portions of the interference fringe pattern.